Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1.-6. (Cancelled).

7. (Currently Amended) ~~The adaptive antenna radio communication device according to claim 1,~~An adaptive antenna radio communication device comprising:

an array antenna made up of a plurality of antenna elements receiving high frequency signals that are transmitted by a multi-carrier;

a demultiplexer for demultiplexing one of the high frequency signals received by a respective one of the antenna elements to a plurality of sub-carrier signals;

Nd divided band direction estimating units for estimating the direction-of-arrival of a radio wave by dividing the communication band being said multi-carrier transmitted into Nd bands and using ones of the plurality of sub-carrier signals belonging to the respective divided bands, wherein Nd is at least 2 or a positive integer less than a number of sub-carriers used for multi-carrier transmission,

a divided band array weight creating unit for creating a weight of a receive array having a directional beam in the direction of estimation by said divided band direction estimating unit for said respective divided bands;

a sub-carrier directivity creating unit for creating a directivity by multiplication-combining the receive array weight created in each divided band with the corresponding sub-carrier signal belonging to the divided band; and

a demodulating unit for demodulating data by using the output of said sub-carrier directivity creating unit,

wherein said divided band direction estimating unit further has a path search unit for calculating a delay profile by calculating a cross correlation between respective

input sub-carrier signals using a known pilot signal embedded in the sub-carrier signal and detecting a plurality of path arrival timings from the delay profile, and estimates the direction-of-arrival based on the correlation value of the pilot signal correlation value calculated between the same sub-carrier signals received by different antenna elements in the respective path arrival timing.

8. (Original) The adaptive antenna radio communication device according to claim 7,

wherein said divided band direction estimating unit estimates the direction-of-arrival using a correlation matrix integrating correlation matrices of the respective sub-carriers detected in the respective sub-carriers belonging to the sub-carrier signals.

9. (Original) The adaptive antenna radio communication device according to claim 7,

wherein said divided band direction estimating unit estimates the direction-of-arrival using a correlation matrix R expressed as

$$R = \sum_{k=1}^{L} \sum_{p=1}^{S} V_k(p) V_k(p)^H$$

where L is the number of sub-carriers belonging to the sub-carrier signals; Vk(p) is a column vector having the pilot signal correlation values as an m-th element in the m-th antenna element of the p-th arrival path (the number of whole arrival paths is specified as S) with respect to the k-th sub-carrier signal; and H is a complex conjugate transposed operator.

10. (Original) The adaptive antenna radio communication device according to claim 7,

wherein said divided band direction estimating unit estimates the direction-of-arrival using a correlation vector integrating correlation vectors of the respective sub-carriers detected in the respective sub-carriers belonging to the sub-carrier signals.

11. (Original) The adaptive antenna radio communication device according to claim 7,

wherein said divided band direction estimating unit estimates the direction-of-arrival using a correlation vector z expressed as

$$z = \sum_{k=1}^{L} \sum_{p=1}^{S} V_{kx}(p) * V_k(p)$$

where L is the number of sub-carriers belonging to the sub-carrier signals; Vk(p) is a column vector having the pilot signal correlation values as an m-th element in the m-th antenna element of the p-th arrival path (the number of whole arrival paths is specified as S) with respect to the k-th sub-carrier signal and * is a complex conjugate operator.

12. (Cancelled).

13. (Original) The adaptive antenna radio communication device according to claim 8,

wherein said divided band direction estimating unit estimates the direction-of-arrival by any one of the MUSIC method, ESPRIT method, CAPON method or Fourier method using said correlation matrix R.

14.-15. (Cancelled).

16. (Original) The adaptive antenna radio communication device according to claim 7, wherein said divided band direction estimating unit has a spatial smoothing processing unit for performing spatial smoothing processing on the correlation matrix R and estimates the direction-of-arrival by using any one of the MUSIC method, ESPRIT method, CAPON method and Fourier method to the output from the spatial smoothing processing unit.

17. (Original) The adaptive antenna radio communication device according to claim 8, wherein the divided band direction estimating unit has a spatial smoothing processing unit for performing spatial smoothing processing on the correlation matrix

R and estimates the direction-of-arrival by using any one of the MUSIC method, ESPRIT method, CAPON method and Fourier method to the output from the spatial smoothing processing unit.

18.-19. (Cancelled).

20. (Original) The adaptive antenna radio communication device according to claim 7,

wherein said divided band direction estimating unit has a unitary converting unit for performing unitary conversion processing on the correlation matrix R and estimates the direction-of-arrival by using any one of the MUSIC method, ESPRIT method, CAPON method and Fourier method to the output from the unitary converting unit.

21. (Original) The adaptive antenna radio communication device according to claim 8,

wherein said divided band direction estimating unit has a unitary converting unit for performing unitary conversion processing on the correlation matrix R and estimates the direction-of-arrival by using any one of the MUSIC method, ESPRIT method, CAPON method and Fourier method to the output from the unitary converting unit.

22.-43. (Cancelled).